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UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE RO

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REPLY TO: 3420 Pest Management Evaluation DATE: November 27, 1985

SUBJECT: Winter Injury in Pine Plantations on Hat Creek Ranger District (Report No. 85-29)

TO: Forest Supervisor, Lassen National Forest

During the winter of 1984/85, about 500 acres of pine plantations on the Hat Creek Ranger District suffered unusually high amounts of needle and twig mortality. In June 1985, Mike Srago (Timber Management-RO) and John Pronos (Forest Pest Management-RO) examined pine plantations in two areas of the District, along with Ken Estes (Forest Silviculturist) and Dan Thompson (District Silviculturist). Their objectives were to define the exact cause of the injury and to determine whether there are any actions that could prevent future damage. Below is their narrative of observations and conclusions.

Deep Hole Plantations: We viewed 10-year old pine plantations with 10' x 10' spacing that had been mechanically released in the fall of 1984. The terminal buds and upper foliage were dead on about 50% of the pines. We do not expect many of these to survive even though most had green cambium in the lower stem. The smallest trees (perhaps indicating the least vigorous) seemed to account for most of the mortality.

Several factors were implicated as causing the observed damage. District personnel stated that the winter of 1984/85 was characterized by below average snow cover and unusually warm daytime temperatures. The symptoms we saw are typical of winter desiccation resulting from a combination of warm temperatures and/or winds and sunny days occurring when the soil is frozen or at low temperatures. As winter injury worsens, tissues are damaged and killed, beginning at the top of the tree, in the following order: youngest needles - older needles - twigs - buds. Snow normally helps to protect trees from winter injury but was not present to a sufficient depth last year. An adjacent plantation was not mechanically released, and there was similar winter injury, but only to tree parts growing above the brush.

Additionally, a few dead seedlings were pulled up, revealing J-roots. A healthy root system could mean the difference between survival and death under these conditions.

Badger Mountain. Several hundred acres of pine plantations were inspected. Almost all of the seedlings on the upper 1/3 of the mountain showed some degree of needle browning due to winter drying. The injury was concentrated on the south-facing portions of trees. Although most trees were affected, the level of injury was low, and since most buds were still green, we expect little mortality. Again, inadequate snow cover and warm sunny winter days when the soil was very cold or frozen would explain most of the symptoms.

Conclusions. Almost all of the observed damage was due to winter desiccation. Deep Hole plantations had the most trees killed and may require replanting. Injury in Badger Mountain plantations was more widespread but less damaging overall to individual trees; affected trees may, however, experience a growth reduction in 1985. Winter weather conditions are obviously unavoidable, but the amount of mortality or tissue damage could be reduced if measures were taken to properly plant appropriate stock.

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